REMARKS

Claims 1-100 are pending in this application. Claims 1-2, 4, 8, 11, 14-21, 24-27, 29, 33, 36, 39-45, 49-52, 54, 58, 61, 64-70, 74-77, 79, 83, 86, 89-96, 99, and 100 stand rejected under 35 U.S.C. 102(e) as being anticipated by DeKoning (U.S. Patent No. 6,148,368). Claims 3, 6, 7, 9, 10, 12, 13, 28, 31, 32, 34, 35, 37, 38, 53, 56, 57, 59, 60, 62, 63, 78, 81, 82, 84, 85, 87, and 88 stand rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning , and further in view of Courtright, II et al. (Courtright)(U.S. Patent No. 6,105,103). Claims 5, 22, 30, 47, 55, 72, 80, and 97 stand rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning , and further in view of Mittal (U.S. Patent No. 5,829,025). Claims 23, 47, 48, 72, 73, 97, and 98 stand rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning and Mittal.

Drawings Objections

The drawings stand objected to because in figure 1, within boxes 110, 120, and130 "cache level", "cache level" and "storage level" respectively should be written out for clarity.

In figure 2, within boxes 250-254, 210, 220 and 230 "disk", "cache level", "cache level" and "storage level" respectively should be written out for clarity.

In figure 3a, within boxes 31(0), 31(1), 31(2), 31(x) "segment" should be written out for clarity.

In figure 3b, within boxes 33(0), 33(1), 33(2), 33(x) "segment element" should be written out for clarity.

In figure 3c, within boxes 35(0), 35(1), 35(2), 35(x) "block" should be written out for clarity.

Replacement drawing sheets are submitted herewith and attached to the end of this paper.

Specification Objections

The disclosure stands objected to because of the following informality: the serial number and patent number of related applications are missing on page 2.

An amendment to the specification is submitted herewith.

Claim Rejections -- 35 U.S.C. §102(e)

Claims 1-2, 4, 8, 11, 14-21, 24-27, 29, 33, 36, 39-45, 49-52, 54, 58, 61, 64-70, 74-77, 79, 83, 86, 89-96, 99, and 100 stand rejected under 35 U.S.C. 102(e) as anticipated by DeKoning (U.S. Patent No. 6,148,368).

The claims of the present application are not anticipated by DeKoning because DeKoning teaches a log-structured cache which is flushed to a main disk region. The main disk region is managed according to conventional storage management methods (e.g., RAID storage management). In contrast, the claims of the present application require a random access first level cache and a log structured second level cache such that the first level cache can be flushed either to the second level cache or to a main disk region (storage level).

Therefore, DeKoning does not teach the storage organization required by the claims.

Claim 1 requires:

"1. A system for storing data, the system having one or more storage devices, the system comprising:
a first cache level for caching data from a sender into a first random-access structure;
a second cache level for caching data from the first cache level into a log structure; and
a storage level for storing data from CL into a second random-access structure, wherein CL is the first cache level or the second cache level."

Paragraph 6 of the office action labels DeKoning 's cache segments 225 and 226 as the "first level cache," which the office action asserts is a random access structure. Paragraph 6 of the office action further labels log structure 235, 236 and 237 as the "second cache level" and main disk structure 234 as "the storage level."

In contrast to the assertion of the office action, DeKoning 's cache segments 225 and 226 are not a random access structure but, rather, a log structure. The following passages in DeKoning (among many others) demonstrate that 225 and 226 is a log structure:

1. Col. 7, lines 42 to 48.

2. Figures 3, 4, etc. where the boxes labeled 225 and 226 includes the legend "Fills with write data log."

3. Col. 9, line 66 to col. 10, line 3, where the process of filling segment 225 is referred to as "logging."

Further, DeKoning 's cache segments 225 and 226 are used as "ping-pong" buffers – when one of these segments is full, further writes are logged to the other segment. The data in a full segment (225 or 226) of the first level cache is flushed to cache extension regions 235, 236, or 237 (see DeKoning col. 10, lines 15 to 39 and figures 3-8). Nowhere does DeKoning teach that data in the first level cache may be flushed directly to the storage level.

Thus, DeKoning fails to teach or disclose a system for storing data that includes "a first cache level for caching data from a sender into a first random-access structure" or "a storage level for storing data from CL into a second random-access structure, wherein CL is the first cache level or the second cache level." To anticipate the embodiment of claim 1 of the present application, DeKoning would have to teach or disclose a system meeting both of these limitations and DeKoning does not. Thus, claim 1 of the present application is patentable over DeKoning . Claims 2 through 25, which depend from claim 1 and add further limitations, are deemed not anticipated by DeKoning for at least the same reasons as for claim 1.

Independent claims 26, 51 and 76 incorporate analogous limitations to the limitations cited above in claim 1. Since DeKoning does not teach or disclose required limitations of claims 26, 51, and 76, DeKoning cannot anticipate these claims. Dependent claims 27-50; 52-75; and 77-100 add further limitations to claims 26, 51 and 76 respectivelyand are deemed not anticipated by DeKoning for at least the same reasons as for claim 26, 51 and 76.

Claim Rejections -- 35 U.S.C. §103(a)

Claims 3, 6, 7, 9, 10, 12, 13, 28, 31, 32, 34, 35, 37, 38, 53, 56, 57, 59, 60, 62, 63, 78, 81, 82, 84, 85, 87, and 88 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning , and further in view of Courtright, II et al., (U.S. Patent No. 6,105,103).

Courtright discloses storing a logical to physical address map on the physical storage subsystem (e.g. disk array) rather than in the memory of the host computer. (See Courtright II, col. 2, lines 45 to 58.) The intent is to reduce the memory requirements on the host. Courtright neither teaches nor suggests the teaching, lacking in DeKoning as shown above, of either:

"a first cache level for caching data from a sender into a first random-access structure" or "a storage level for storing data from CL into a second random-access structure, wherein CL is the first cache level or the second cache level."

Since neither DeKoning nor Courtright teaches these required limitations of claims 3, 6, 7, 9, 10, 12, 13, 28, 31, 32, 34, 35, 37, 38, 53, 56, 57, 59, 60, 62, 63, 78, 81, 82, 84, 85, 87, and 88, the combination of DeKoning and Courtright cannot provide these teachings. Thus, these claims are deemed nonobvious over DeKoning in view of Courtright.

Claims 5, 22, 30, 47, 55, 72, 80, and 97; and 23, 47, 48, 72, 73, 97, 98 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning , and further in view of Mittal (U.S. Patent No. 5,829,025). Mittal teaches a technique for providing hierarchical management of cache memories. (See

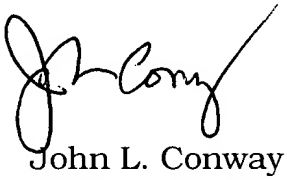
Mittal, col. 2, line 62 to col. 3, line 13.) Mittal's method consists of including a cache locality hint within an instruction. None of Mittal's caches are log structured since these caches are between the execution unit 23a and main memory 11a (see Mittal fig. 5, for example). A log structured cache provides no benefit versus a random access cache in this organization. Mittal neither teaches nor suggests the teaching, lacking in DeKoning as shown above, of:

"a storage level for storing data from CL into a second random-access structure, wherein CL is the first cache level or the second cache level.," where the "second cache level for caching data from the first cache level is (into) a log structure."

Since neither DeKoning nor Mittal teaches required limitations of claims, 5, 22, 30, 47, 55, 72, 80, and 97; and 23, 47, 48, 72, 73, 97, 98, the combination of DeKoning and Mittal cannot provide these teachings. Thus, these claims are deemed nonobvious over DeKoning in view of Mittal.

The Commissioner is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 19-4972. Applicants request reconsideration of all claims and a notice of allowance. The Examiner is requested to telephone the undersigned if any matters remain outstanding so that they may be resolved expeditiously.

Respectfully submitted,



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